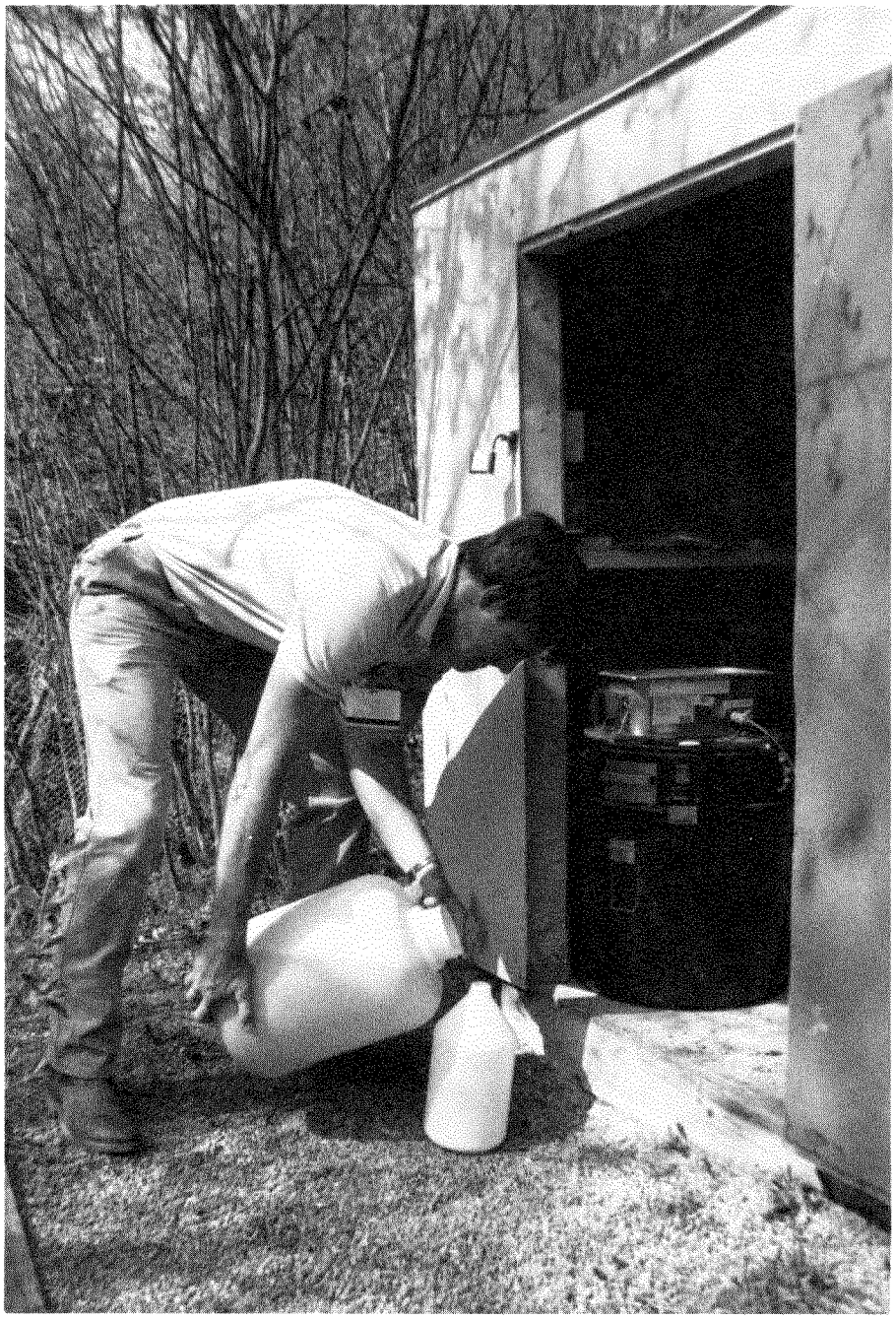


COLLECTING A COMPOSITE SURFACE WATER SAMPLE

2.0 Effluent and Environmental Monitoring

2.1 Air Monitoring

2.1.1. Radiological Monitoring

In 1989 airborne particulate radioactive samples were collected continuously at five locations around the perimeter of the site and at four remote locations at Great Valley, West Valley, Springville, and Dunkirk, New York. (See Figure 2-1). Perimeter locations are on Fox Valley Road, Rock Springs Road, Route 240, Thomas Corners Road, and Dutch Hill Road. These locations were chosen to provide data from places most likely to provide the highest concentrations, based on meteorological observations in the area. The remote locations provide data from nearby communities and from natural background areas.

Sample Collection

Air samples are collected by drawing air through a very fine filter with a vacuum pump. The total volume of air drawn through the sampler is measured and recorded by a meter. The filters trap particles of dust which are then tested in the laboratory for radioactivity. At two locations (AFRSPRD and AFGRVAL)samples are also collected for iodine-129 using activated carbon cartridges. Three of the perimeter samplers, mounted on towers four meters high, maintain an average air flow of about 40 L/min (1.5 ft^3/min) through a 47-mm glass fiber filter. The remaining perimeter samplers and the four remote samplers operate with the same air flow rate as the three mounted on towers, but the sampler head is set at 1.7 meters above the ground, the height of the average human breathing zone.

Concentrations measured at Great Valley (AFGRVAL, 29 km south of the site) and Dunkirk (AFDNKRK, 50 km west of the site) are considered to be representative of natural background radiation. Data from these samplers are provided in Appendix C-2, Tables C-2. 18 and C-2.19.

Filters from all samplers were collected weekly and analyzed after a seven-day "decay" period to remove interference from short-lived naturally occurring radioactivity.

In addition, quarterly composites consisting of thirteen weekly filters from each sample station were analyzed. Gross alpha and gross beta measurements of each filter were made using a low-background gas proportional counter. A complete tabulation of these stations is given in Tables C-2. 12 through C-2.20 in Appendix C-2.

Radioactivity Concentrations

The average monthly concentrations ranged from 1.09E-14 μCi/mL to 8.23E-14 μCi/mL(4.0E-4 Bq/m^3 to 3.0E-3 Bq/m^3) of beta activity and 5.25E-16 μCi/mL to 4.12E-15 μCi/mL (1.9E-5 Bq/m^3 to 1.5E-4 Bq/m^3) of alpha activity. Iodine-129 was not detected at either location AFRSPRD or AFGRVAL, as shown in Tables C-2.13 and C-2.18 in Appendix C-2.

In all cases, the measured monthly gross activities were well below 3E-12 μCi/mL beta and 2E-14 μCi/mL alpha, the most stringent acceptable limits (referred to as Derived Concentration Guides, or DCGs)set by the Department of Energy for any of the isotopes present at the WVDP. Department of Energy standards and DCGs for radionuclides of interest at the West Valley Demonstration Project can be found in Appendix B.

Annual data for the three samplers which have been in operation since 1983 average about 1.98E-14 μCi/mL (7.3E-4 Bq/m^3) of gross beta activity in air. The annual average gross beta concentration at the Great Valley background station was 2.1E-14 μCi/mL (7.8E-4 Bq/m^3) in 1988, and averaged 2.04 E-14 μCi/mL (7.5E-4 Bq/m^3) in 1989.

Global Fallout

Global fallout is also sampled at four of the perimeter air sampler locations. Material from open pots located near the samplers is collected and analyzed every month. The 1989 data from these analyses are found in Appendix C-2, Tables C-2.21

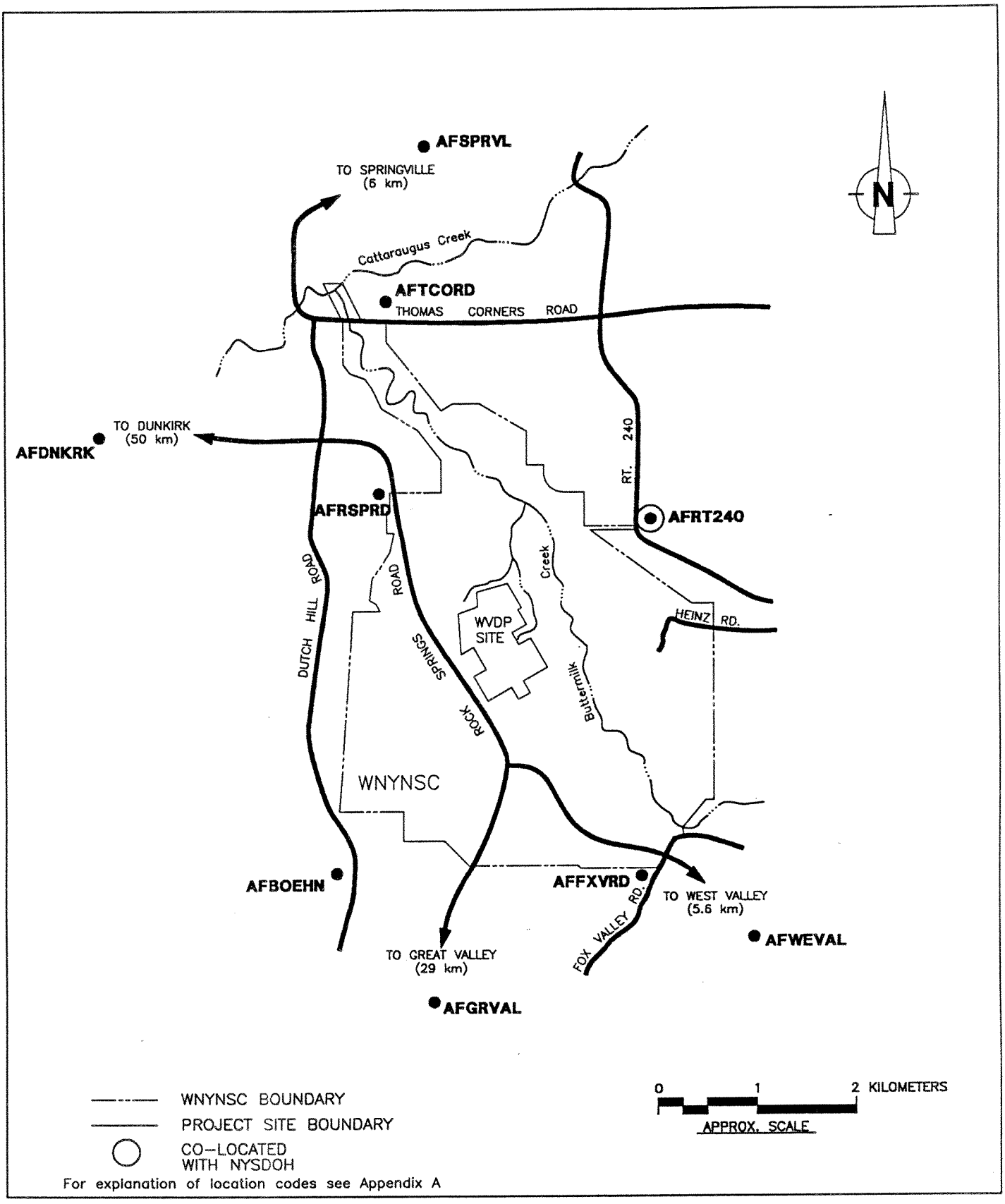


Figure 2-1. Off-Site Air Sampler Locations.

and C-2.22. These collections indicate short-term effects. Results from these measurements are reported in nCi/m^2 per month for gross alpha and beta. These reporting units indicate a rate of deposition rather than the actual concentration of activity within the collected water. Long-term deposition is measured by surface soil samples collected annually near each sampling station. The data will be published in next year's report.

Ventilation Systems

The exhaust from each ventilation system serving the site facilities is continuously filtered, monitored, and sampled as it is released to the atmosphere. Specially designed isokinetic nozzles continuously remove a representative portion of the exhaust air which then is drawn through very fine, small, glass-fiber filters to trap any particles. Sensitive detectors that continuously measure the radioactivity on these filters provide remote readouts of alpha and beta radioactivity levels to control display panels. A separate stack monitoring sample unit on each system provides another filter that is removed every week and subjected to additional laboratory testing.

This sampling system also contains an activated carbon cartridge used to collect a sample for iodine-129. Water vapor from the plant stack is collected by trapping moisture on silica gel desiccant columns. The trapped water is then distilled from the silica gel desiccant and analyzed for tritium.

Because tritium and iodine concentrations are quite low, the large-volume samples collected weekly from the plant stack provide the only practical means of determining the amount of specific radionuclides released from the facility.

The main ventilation stack (ANSTACK) sampling system remained the most significant airborne effluent point in 1989. A high sample collection flow rate through multiple intake nozzles ensures a representative sample for both the weekly filter and on-line monitoring system. Variations in monthly concentrations of airborne radioactivity reflect the level of Project activities within the facility. (See Appendix C-2, Table C-2.1). However, at the point of discharge, average radioactivity levels were already below concentration guides for airborne radioactivity in an unrestricted environment. (See Appendix C-2, Table C-2. 3). Further dilution from the stack to the site boundary reduces the concentration by an average factor of about 200,000.

The total quantity of gross alpha, gross beta , and tritium released each month from the main stack, based on weekly filter measurements, is shown in Appendix C-2, Table C-2. 1. The results of analyses for specific radionuclides in the four quarterly composites of stack effluent samples are listed in Table C-2. 2.

Sampling systems similar to the main stack system monitor airborne effluents from the cement solidification system ventilation stack (ANCSSTK), the contact size reduction facility ventilation stack (ANCSRFK), and the supernatant treatment system ventilation stack (ANSTSTK). The 1989 samples showed detectable gross radioactivity, including specific beta and alpha emitting isotopes, but did not approach any Department of Energy effluent limitations. (See Tables C-2. 4 through C-2.9 in Appendix C-2).

Three other operations are routinely monitored for airborne radioactivity releases: the low-level waste treatment facility (ANLLWTF), the contaminated clothing laundry (ANLAUNV), and the supercompaction volume reduction system (ANSUPCV). Results for the supercompaction volume reduction system are found in Tables C-2. 10 and C-2. 11.

The total amount of radioactivity discharged from facilities other than the main ventilation stack is less than 1% of the airborne radioactivity released from the site and is not a significant factor in the airborne pathway in 1989.

2.1.2. Nonradiological Monitoring

Nonradiological emission and plant effluents are controlled and permitted under New York State and U.S. Environmental Protection Agency regulations. The WVDP operated ten stationary sources of airborne effluents in 1989. An additional permit pertaining to a source of airborne effluents generated from the construction of the vitrification off-gas system is presently inactive because construction has been completed. Cold-testing of the vitrification off-gas system was completed in April 1989. Subsequently, in November 1989, the corresponding permit was discontinued. The permits are for minor

sources of regulated pollutants including particulates, nitric acid mist, oxides of nitrogen, and sulfur. However, because of their insignificant concentrations and small mass discharge, monitoring of these parameters is not required.

The individual air permits held by the WVDP are identified and described in Appendix C-5, Table C-5.1.

2.2 Surface Water and Sediment Monitoring

2.2.1 Radiological Monitoring

Four automatic samplers collect surface water at points along the site drainage channels. Water collection points were chosen at locations most likely to show any radioactivity released from the site and at a background station upstream of the site.

Sample Collection

The samplers draw water through a tube extending to an intake below the stream surface. An electronically controlled battery-powered pump first blows air through the sample line to clear any debris. The pump then reverses to collect a sample, reverses again to clear the line, and then resets itself. The pump and container are housed in a small insulated and heated shed to allow sampling throughout the year.

An off-site sampler (WFFELBR) on Cattaraugus Creek at Felton Bridge just downstream of the confluence with Buttermilk Creek, the major surface drainage from the Western New York Nuclear Service Center (Figure 2-2), periodically collects an aliquot (a small volume of water, approximately 100 mL/hour) from the creek. A chart recorder keeps track of the stream depth during the sample period so that a flow-weighted weekly sample can be proportioned into a monthly composite based on relative stream depth. Gross alpha, beta, and tritium analyses are performed each week, and the composite is analyzed for strontium-90 and gamma-emitting isotopes.

In addition to the Cattaraugus Creek sampler, two surface water monitoring stations are located on Buttermilk Creek. Samplers collect water from a background location upstream of the Project (WFBCBKG) and from a location at Thomas Corners Road downstream of the plant and upstream of the confluence with Cattaraugus Creek (WFBCTCB). These samplers collect a 25 mL aliquot every half-hour. Samples are retrieved biweekly, composited monthly, and analyzed for tritium, gross alpha, and gross beta radioactivity. A quarterly composite of the biweekly samples is analyzed for gamma-emitting isotopes and strontium-90.

The fourth station (WNSP006) is located on Frank's Creek where Project site drainage leaves the security area (Figure 2-3). This sampler collects a 50 mL aliquot every half-hour. The sample is retrieved weekly, analyzed for tritium, gross alpha and beta radioactivity, and composited monthly. The monthly composite is analyzed for strontium-90 and gamma-emitting isotopes. A quarterly composite is analyzed for carbon-14, iodine-129, and alpha-emitting isotopes.

Tabulated data from surface water samplers are provided in Appendix C-1, Tables C-1.3 through C-1.7.

Radioactivity Concentrations

Radiological concentration data from these sample points show that average gross radioactivity concentrations generally tend to be higher in Buttermilk Creek below the WVDP site, presumably because of the small amount of activity from the site which enters via Frank's Creek. The range of gross beta activity, for example, was 1.4E-9 to 6.1E-9 μCi/mL (5.2E-2 to 2.3E-1 Bq/L) upstream in Buttermilk Creek at Fox Valley (WFBCBKG), and from 2.3E-9 to 1.6E-8 μCi/mL (8.5E-2 to 5.9E-1 Bq/L) in Buttermilk Creek at Thomas Corners Bridge (WFBCTCB). (See Tables C-1.3 and C-1.4). Concentrations below the site are only marginally higher than background concentrations upstream of the site, and only during months of Lagoon 3 discharge. Despite monthly values showing site influence on Cattaraugus Creek and Felton Bridge, yearly averages for Cattaraugus Creek are not significantly higher than background (Buttermilk Creek upstream), based on statistical evaluation.

In comparison, if the most restrictive beta-emitting radionuclide is used (iodine-129), the maximum concentration measured in Buttermilk Creek at Thomas Corners Bridge where dairy cattle have access is 3.2% of the Department of Energy's derived concentration guide (DCG) for unrestricted use. (See Appendix B for a list of acceptable concentration limits). At the Project security fence more than four kilometers from the nearest

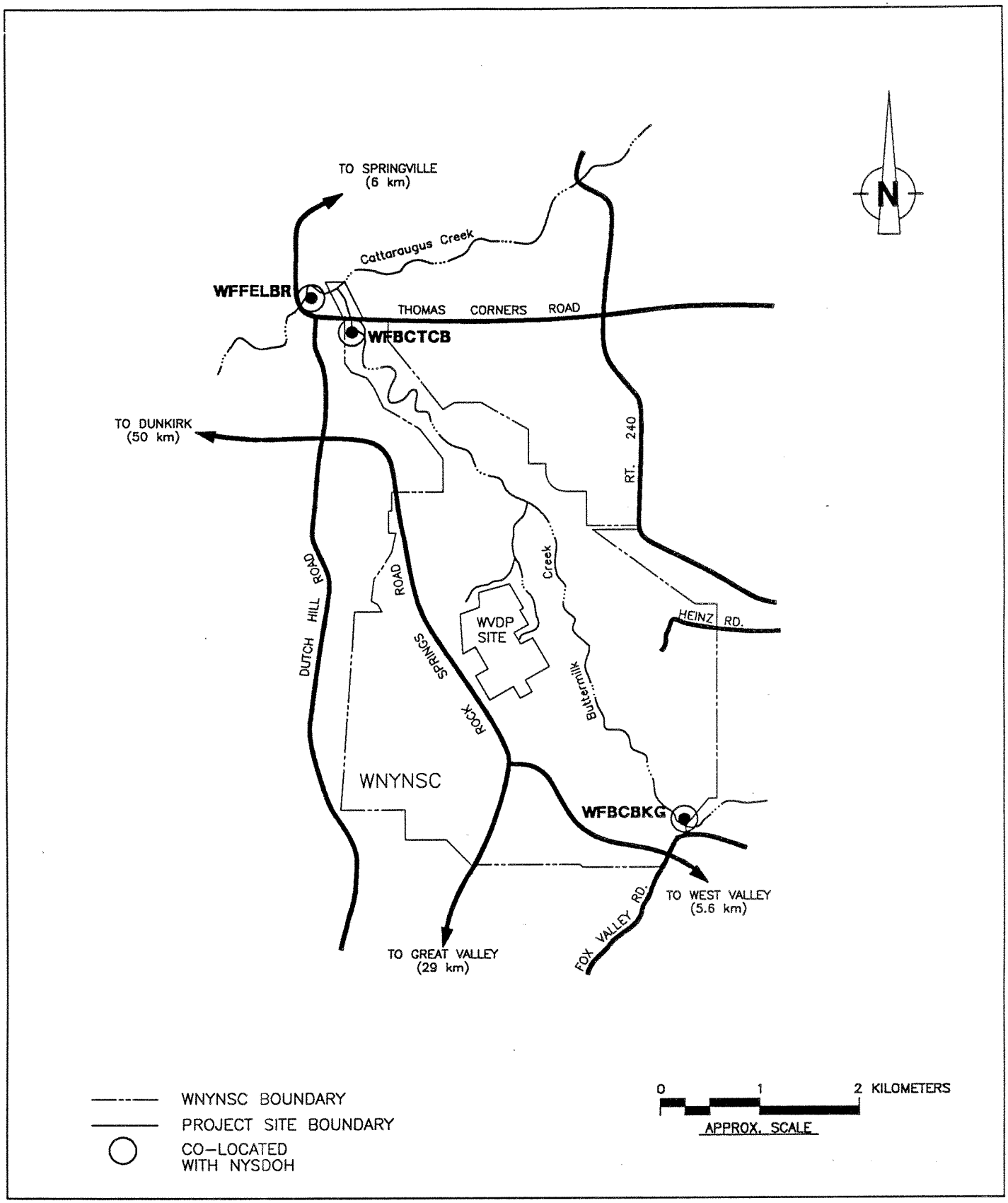


Figure 2-2. Sampling Locations for Off-Site Surface Water.

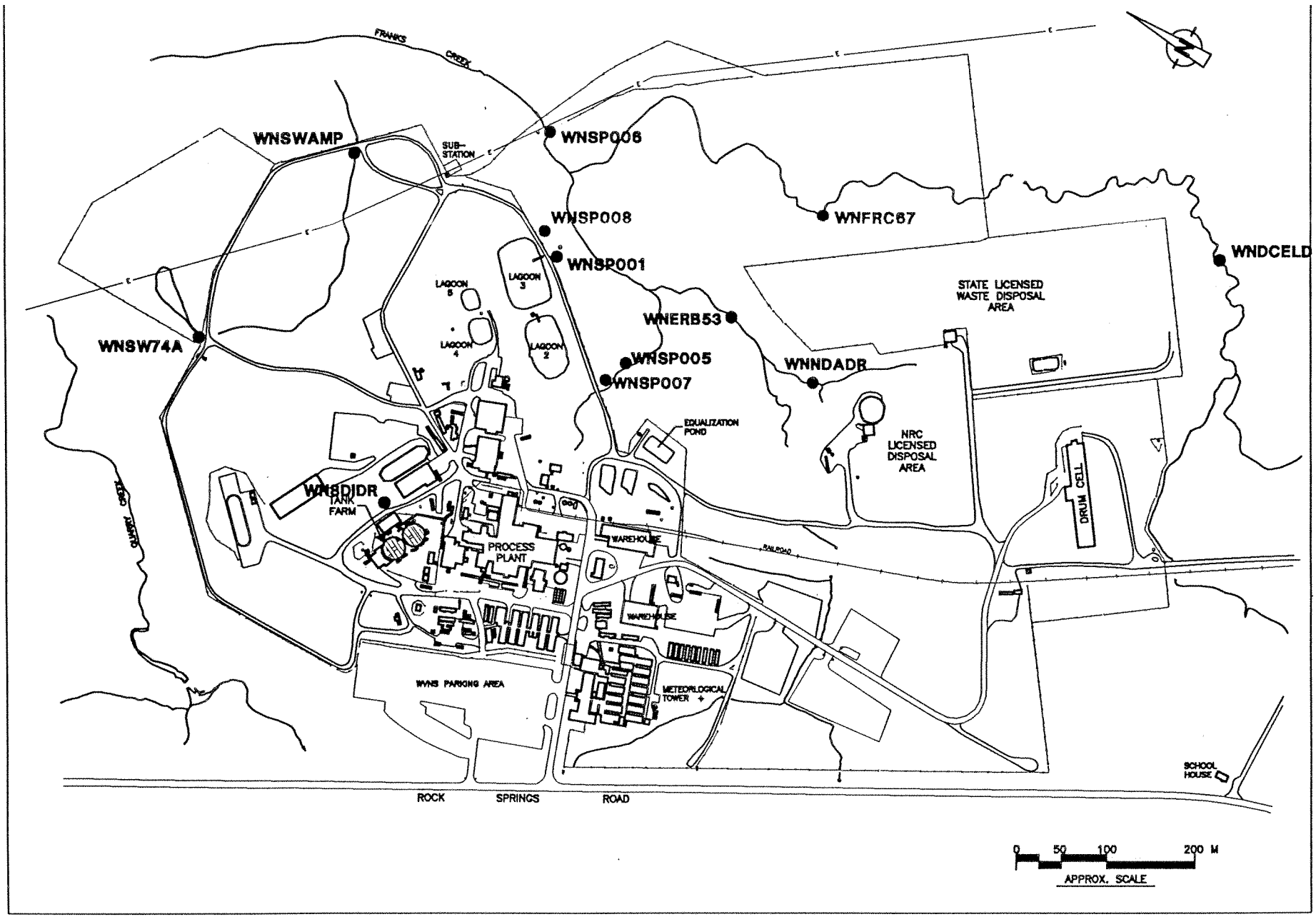


Figure 2-3. Sampling Locations for On-Site Surface Water.

public access point, the most significant beta-emitting radionuclides were measured at 9.4E-8 μCi/mL (3.5 Bq/L) for cesium-137 and 2.2E-8 μCi/mL(8.1E-1 Bq/L) for strontium-90 during the period of highest concentration. This corresponds to 3.1% and 2.2% of the DCGs for cesium-137 and strontium-90, respectively. The annual average was 1.7% for cesium and 1.6% for strontium. Tritium, at an annual average of 4.3E-6 μCi/mL (1.6E2 Bq/L), was 0.2% of the DCG values. Except for three months of the year, the gross alpha was below the average detection limits of 1.5E-9 μCi/mL (5.6E-2 Bq/L), or less than 5% of the DCG for americium-241. The positive values were 21% of the DCGs in October and 6% of the DCGs in March and November, assuming that all alpha-emitting isotopes were americium-241.

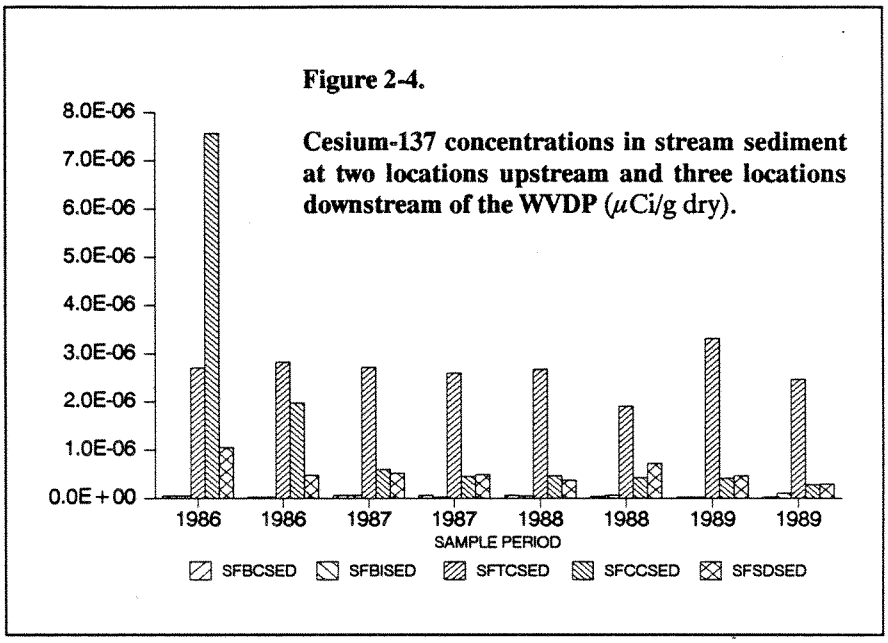


Figure 2-4.

Cesium-137 concentrations in stream sediment at two locations upstream and three locations downstream of the WVDP (μCi/g dry).

The highest concentrations in monthly composite water samples from Cattaraugus Creek during 1989 show strontium-90 to be less than 0.9% of the DCGs for drinking water. No gamma-emitting fuel cycle isotopes were detected in Cattaraugus Creek water during 1989 (Table C-1.7).

The largest single source of radioactivity released to surface waters from the Project is the discharge from the low-level waste treatment facility (LLWTF) through the Lagoon 3 weir (WNSP001, Figure 2-3) into Erdman Brook, a tributary of Frank's Creek. There were four batch releases totaling about 39 million liters in 1989. The effluent was grab sampled daily during the 43 days of release and analyzed. The total amounts of radioactivity in the effluent are listed in Table C-1. 1. Of the activity released, 1.7% of the tritium and 3.9% of the other gross radioactivity originated in the New York State disposal area (based on measurements of water transferred in 1989 from the state area to the LLWTF) and not from previous or current Project operations (See Table C-1. 10). The annual average concentrations from the Lagoon 3 effluent discharge weir, including all measured isotope fractions, were less than 30% of the DCGs (Table C-1. 2 in Appendix C-1).

Results of sediment sampling from streams above and below the Project are shown in Table C-1. 9. These results are similar to those obtained for gamma-emitting nuclides during 1988. A comparison of 1986-1989 cesium-137 data for the two upstream locations and the three downstream locations is found in Figure 2-4. As indicated, cesium-137 concentrations are decreasing or staying constant with time for the locations downstream of the project (SFTCSED, SFCCSED, and SFSDSED). Concentrations of cesium-137 in upstream locations have remained consistent throughout the time period. A comparison of cesium-137 to naturally occurring potassium-40 as shown in Figure 2-5 for the downstream location nearest the Project (SFTCSED) indicates that cesium-137 is present at levels lower than naturally occurring gamma emitters.

2.2.2. Nonradiological Monitoring

Liquid discharges are regulated under the State Pollutant Discharge Elimination System (SPDES). The WVDP holds a SPDES permit which identifies the outfalls where liquid effluents are released to

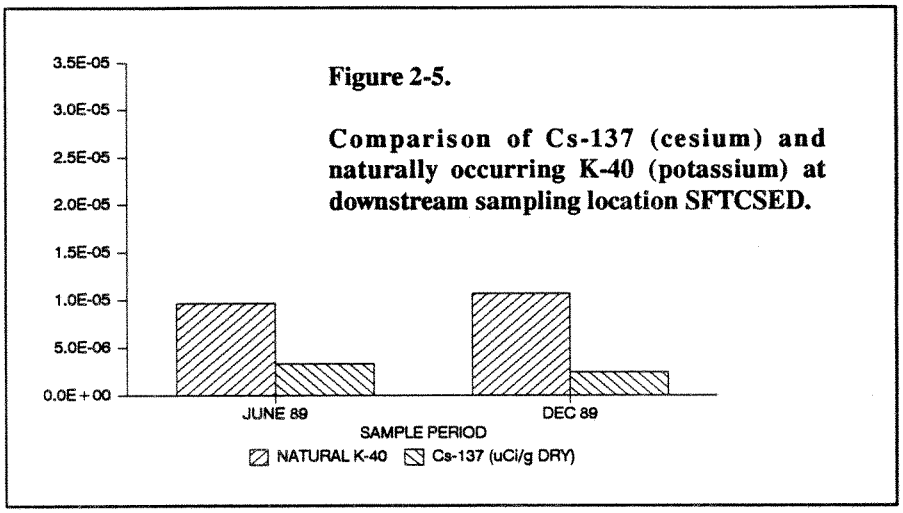


Figure 2-5.

Comparison of Cs-137 (cesium) and naturally occurring K-40 (potassium) at downstream sampling location SFTCSED.

Erdman Brook and which specifies the sampling and analytical requirements for each outfall. (See Figure 2-11 below). This permit was modified in 1988 to include additional monitoring requirements at outfall WNSP001.

Three outfalls are identified in the permit: outfall 001, discharge from the LLWTF; outfall 007, discharge from the sanitary and utility effluent mixing basin; and outfall 008, groundwater effluent from the perimeter of the low-level waste treatment facility storage lagoons. The conditions and requirements of the current SPDES permit are summarized in Table C-5.2 in Appendix C-5.

The most significant features on the SPDES permit are requirements to report data as flow-weighted concentrations and to apply a net discharge limit for iron. The net limit allows for subtraction of incoming, naturally present amounts of iron from the Project's effluent. The flow-weighted limits apply to the total discharge of Project effluents but allow maximum credit for dilute waste streams in determining compliance with effluent concentration limits specified in the permit. (See Figure 2-11 below).

The SPDES monitoring data for 1989 are graphically displayed in Figures C-5. 2 through C-5. 31 in Appendix C-5. The WVDP reported a total of twenty-nine noncompliance episodes in 1989, which are described in Table C-5.3.

2.3 Radioactivity in the Food Chain

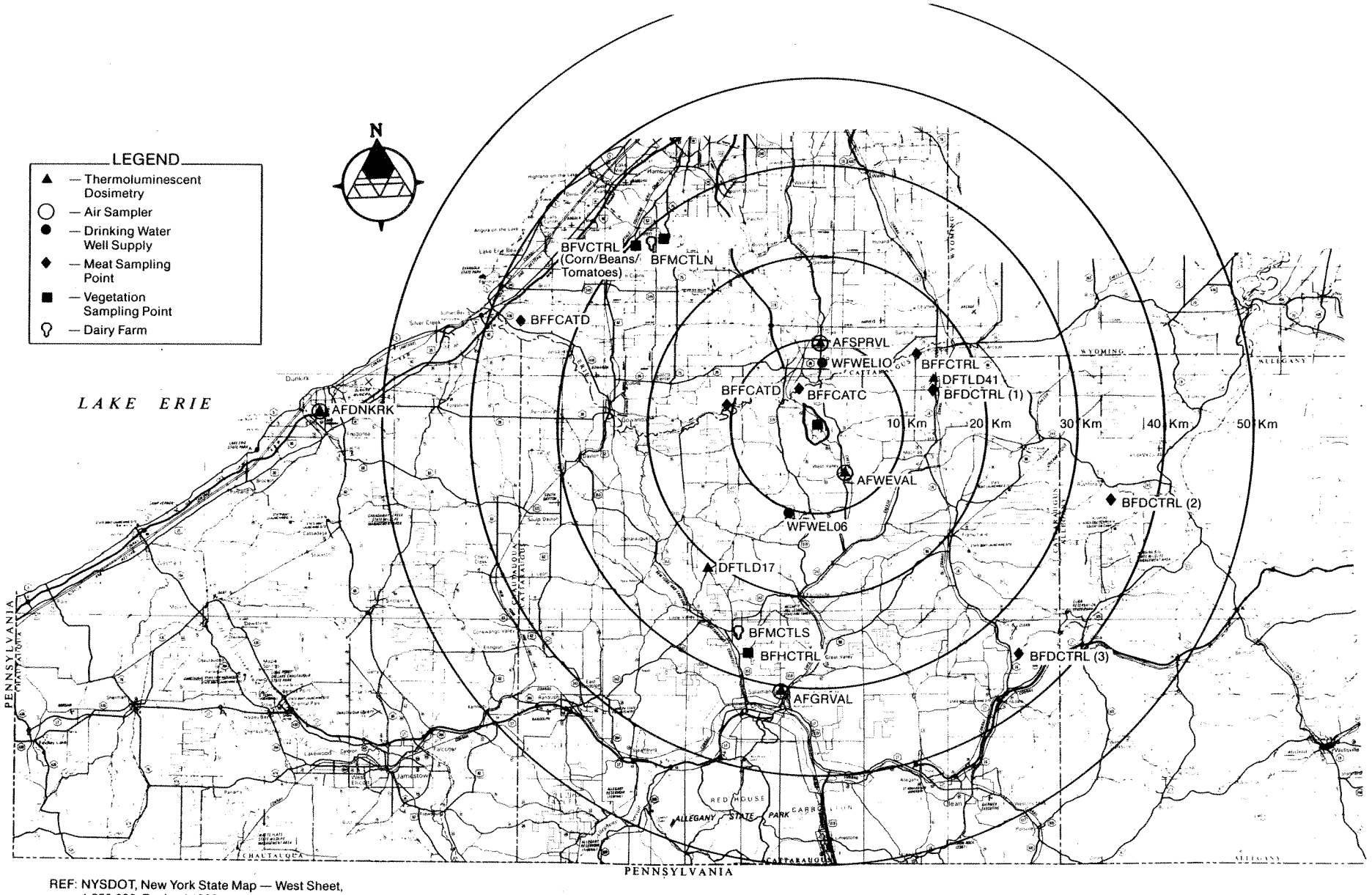
Samples of fish and deer were collected near the site and from remote locations during the periods when they would normally be taken by sportsmen for consumption. Milk and beef from cows grazing near the site and at remote locations as well as hay, corn, tomatoes, and beans were also collected and analyzed during 1989. Locations of remote background samples are shown on Figure 2-6. The results of these analyses are found in Appendix C-3.

Fish

Fish samples were collected semiannually during 1989 above Springville dam and from the portion of Cattaraugus Creek which receives WNYNSC drainage (BFFCATC). Ten fish were collected from this section of the stream during each period. The strontium-90 content and gamma-emitting isotopes in flesh were determined for each specimen. Fish samples (BFFCATD) were also taken from Cattaraugus Creek below the dam, including species that migrate nearly forty miles upstream from Lake Erie. These specimens were representative of sport fishing catches in the drainage downstream of the dam at Springville.

Control samples containing only natural background radiation provided comparisons with the concentrations found in fish taken from site-influenced waters. A similar number of fish were taken from waters that are not influenced by site runoff (BFFCTRL), and their edible portions were analyzed for the same isotopes. These control samples were representative of the species collected in Cattaraugus Creek downstream from the WVDP (Table C-3.4).

The concentrations of strontium-90 in the edible flesh of fish sampled above and below the Springville dam and at the background location were comparable to 1988 levels. A one-way analysis of variance (ANOVA) for strontium-90 in fish flesh for



REF: NYSDOT, New York State Map — West Sheet, 1:250,000, Revised 1982

FIGURE 2-6. SAMPLE POINTS IN THE WVDP ENVIRONS

control and downstream samples revealed no significant differences between sample locations. The log-normal statistical treatment of the fish data presented in Table C-3.4 is appropriate to the sample type being reported. (USDOE, DOE/EP-0023, 1981).

Venison

Specimens from an on-site deer herd were analyzed for radioactive components. The average concentration of strontium-90 and cesium-137 in the venison showed little deviation from 1988 levels, assumed to be background for the area. Data from control, or background, deer samples collected in 1989 indicated again only little deviation from expected background. Both sets of 1989 data are shown in Table C-3.2 for comparison.

Meat and Milk

The concentration of strontium-90 in beef samples from near-site farms appeared slightly elevated compared to control samples. However, cesium-137 was elevated in control samples as compared to those collected near the site. (See Table C-3.2 in Appendix C-3).

Milk samples were taken in 1989 from dairy farms near the site (Figure 2-7) and from control farms at some distance. Besides the quarterly composite sample from the maximally exposed herd to the north (BFMREED), an additional quarterly composite of milk was taken from a nearby herd to the northwest (BFMCOBO). Single samples were taken from herds to the south (BFMWIDR) and southwest (BFMHAUR). Two samples from control herds (BFMCTLN and BFMCTLS) were also collected as quarterly composites. Each sample or composite was analyzed for strontium-90, tritium, iodine-129, and gamma-emitting isotopes (Table C-3.1). Strontium-90 in samples from near the site ranged from 1.E-9 to 4.8E-9 μCi/mL (4.1E-3 to 1.8E-2 Bq/L) compared to the control samples at 2.0E-9 to 4.1E-9 μCi/mL(7.4E-3 to 1.5E-2 Bq/L). Iodine-129 was not detected in any samples to the lower limit of detection (LLD) of 8E-10 μCi/mL (3.0E-3Bq/L). Although tritium values above detection limits were seen in milk samples taken from near-site farms in 1989, higher values were seen in samples taken from distant control locations.

Fruit and Vegetables

Based on the samples analyzed in 1989 (Table C-3.3), there was no detectable difference in the concentration of tritium, strontium-90, or gamma-emitting isotopes in corn, beans, or tomatoes grown either near the site or at remote locations.

2.4 Direct Environmental Radiation

The current monitoring year, 1989, was the sixth full year in which direct penetrating radiation was monitored at the West Valley Demonstration Project using TL-700 lithium fluoride (LiF) thermoluminescent dosimeters (TLDs) located as shown on Figures 2-6, 2-8 and 2-9. The uncertainty of individual results and averages were acceptable and measured exposure rates were comparable to those of 1988. There were no significant differences in the data collected from the background TLDs (Locations 17, 23 , 34, and 41) and from those on the WNYNSC perimeter for the 1989 reporting period.

Dosimeters used to measure ambient penetrating radiation during 1989 were processed on-site. The system used Harshaw TL-700 LiF chips which are used solely for environmental monitoring apart from the occupational dosimetry TLDs. The environmental TLD package consists of five TLD chips laminated in a thick card bearing the location identification and other information. These cards are placed at each monitoring location for one calendar quarter (3 months) and then processed to obtain the integrated gamma radiation exposure.

Monitoring points are located around the site perimeter and access road, at the waste management units, at the inner facility fence, and at background locations remote from the WVDP site. Appendix C-4 provides a summary of the results for each of the environmental monitoring locations by calendar quarter along with averages for comparison.

The quarterly averages and individual location results show very slight differences due to seasonal variation, and the data obtained for all four quarters compared favorably to the respective quarterly data in 1988 with no unusual situations observed. The sixteen perimeter TLD average was 19.4 milliroentgen (18.6 mrem) in 1989. A comparison of the perimeter TLD quarterly averages since 1983 is shown in Figure 2-10. Presumably because of their

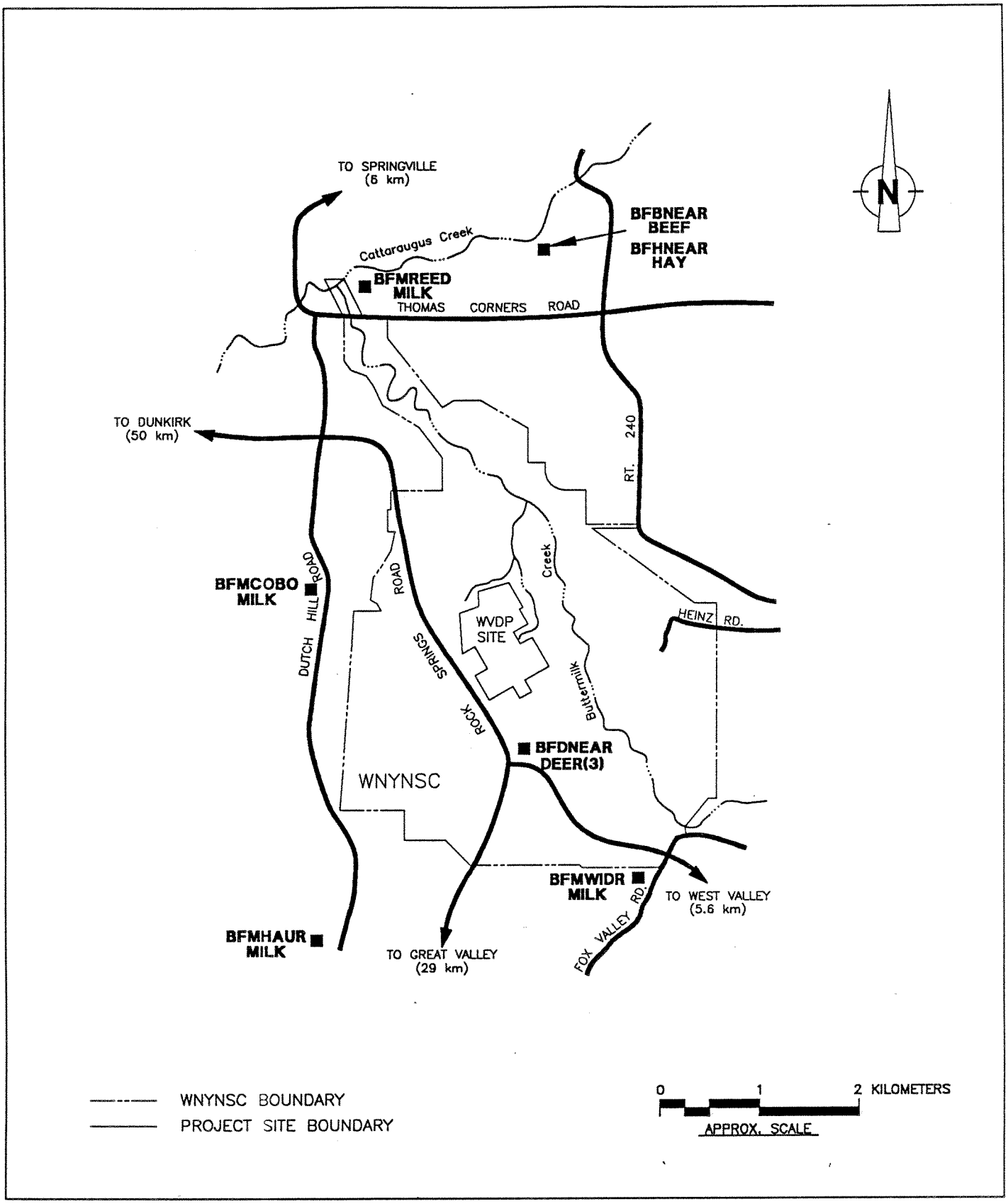


Figure 2-7. Biological Samples Taken Near the WVDP.

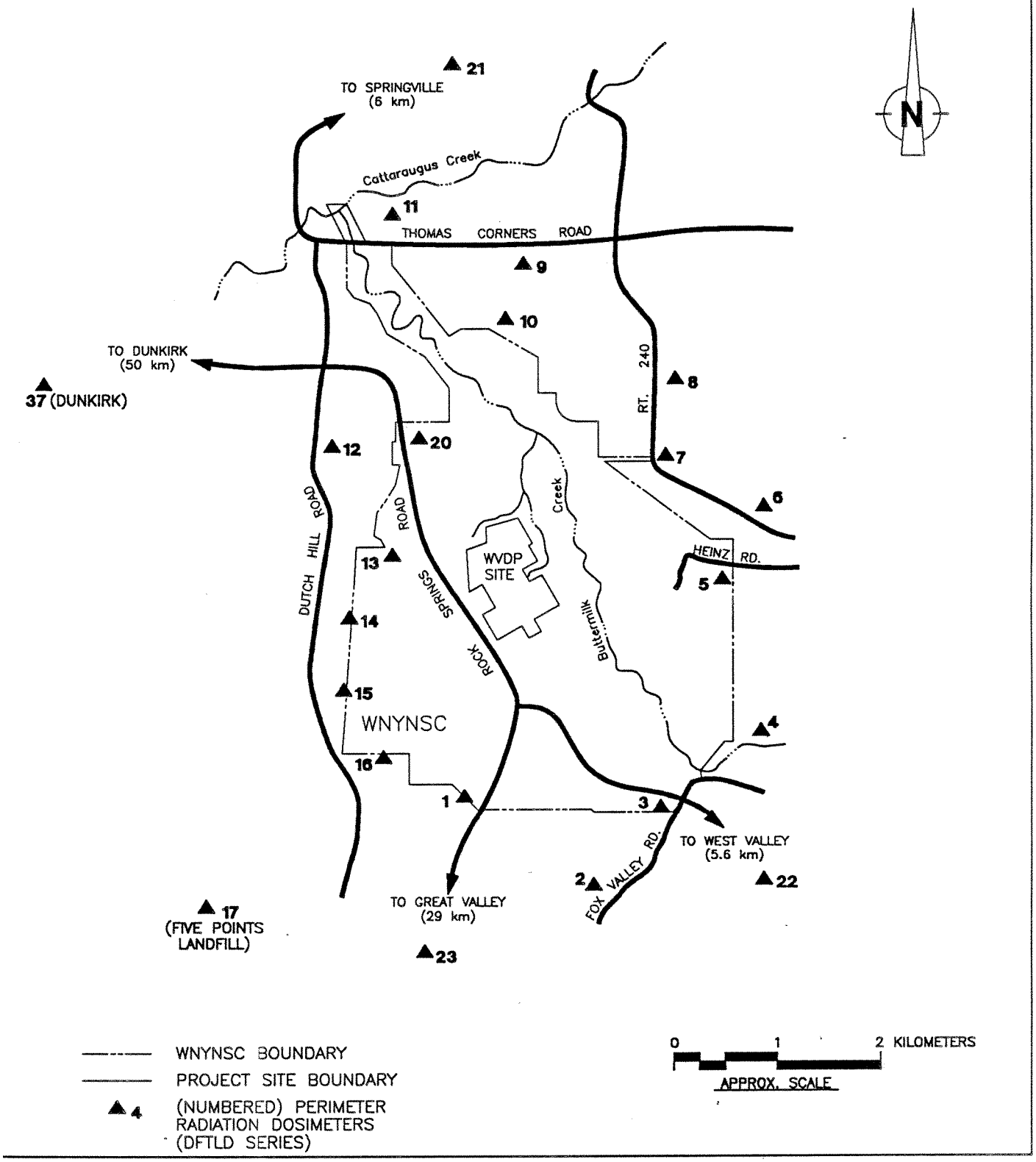


Figure 2-8. Location of Perimeter Thermoluminescent Dosimetry (TLD).

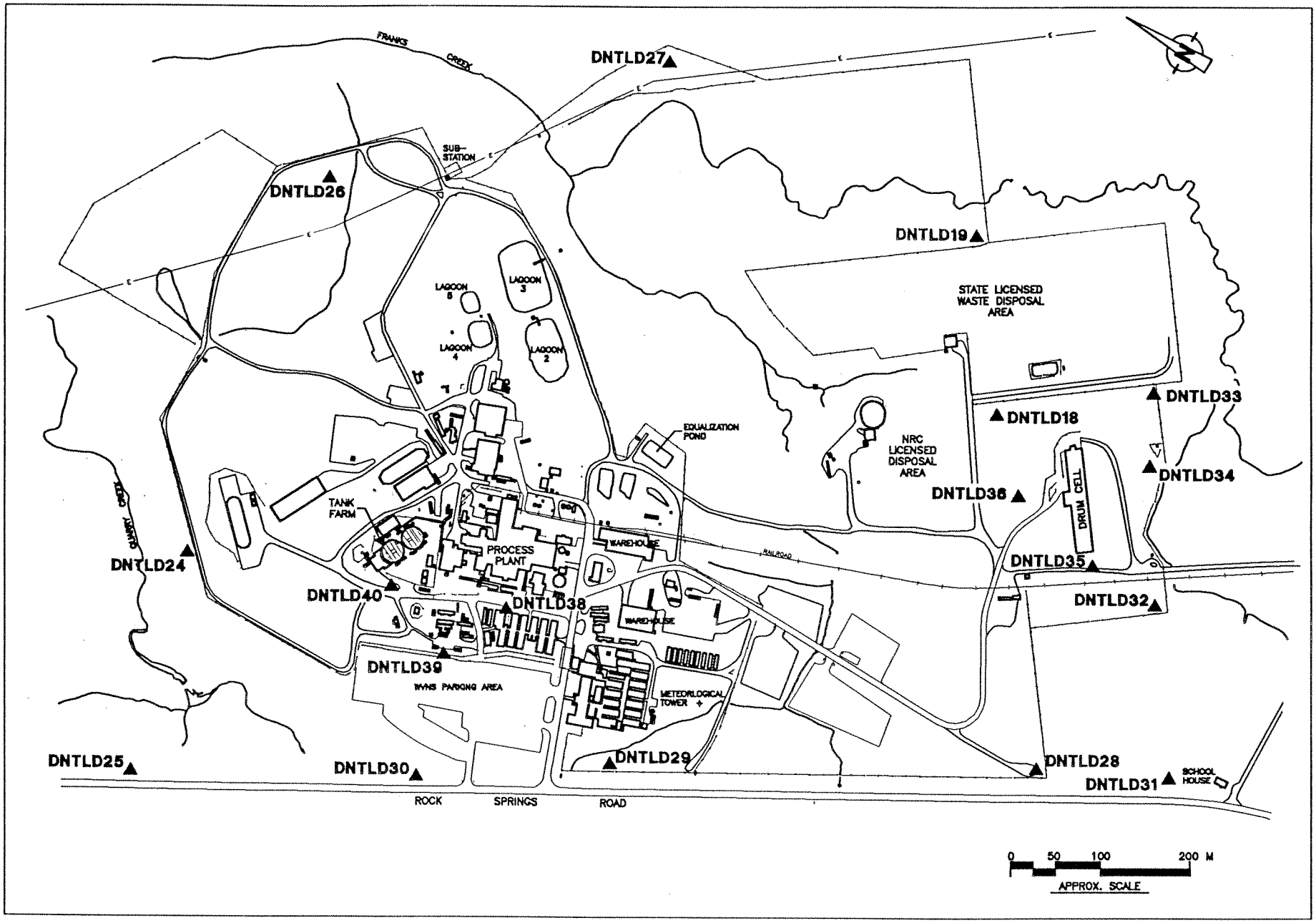


Figure 2-9. Location of On-Site Thermoluminescent Dosimetry (TLD)

proximity to the low-level waste disposal area, the dosimeters at locations 18 and 19 showed a small elevation in radiation exposure compared to the WNYNSC perimeter locations. Although above background, the readings are relatively stable from year to year. Location 25, on the public access road through the site north of the facility, also showed a small elevation above background because decontamination wastes are stored near location 24 within the inner facility fence.

Location 24 on the north inner facility fence, like Locations 18 and 19, is not included in the off-site environmental monitoring program; however, it is a co-location site for one NRC TLD. (See Appendix D, Table D-6). This point received an average exposure of 0.67 milliroentgens (mR) per hour during 1989, which is primarily attributable to the nearby storage of sealed containers of radioactive components and debris from plant decontamination efforts. The storage area is well within the WNYNSC boundary (as are locations 18 and 19) and not readily accessible to the public. TLD locations 26 through 36 are located along the Project security fence, forming an inner ring of monitoring around the facility area. TLDs 37 through 40 were added in 1987 to monitor a third background location and to improve coverage of waste management units and on-site sources respectively. TLD 41 in Sardinia, approximately 20 km to the east of the Project, was added in 1989 to monitor a fourth background location. Figures C-4.1 and C-4.2 in Appendix C show the location average for off-site and on-site TLDs respectively.

Four other projects completed the 1989 pollution abatement efforts:

- The equalization basin outfall was fitted in mid-summer with a shutoff valve sensitive to pH variations in order to control the variations in pH which occasionally would result in effluent water with a pH beyond the permitted limits. A pH detector in the basin shuts the drain by a remote actuator if the pH approaches the limit in either direction and an alarm notifies the system operators that the valve is shut so that they can adjust and put the system back on-line without violating the outfall permit conditions.

- The water treatment system's nonradioactive sludge settling pond outfall, previously routed to the utility drainage ditch, was diverted to the equalization basin. This was to have been finished during construction of the equalization basin but was not completed until November of 1989.

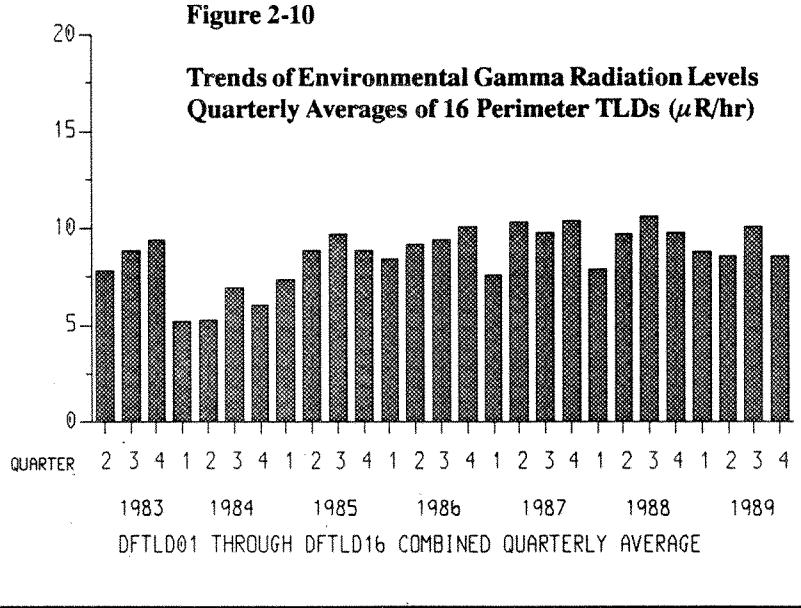
- A major testing program to qualify a method of reducing the nitrogen oxides emissions from the vitrification process was completed in 1989, resulting in an acceptable design that will control future nitrogen oxides emissions. Although this technology is to be applied to a system still under construction, it represents a considerable effort toward reducing potential pollution at the source.

2.5 Pollution Abatement

Major pollution control and abatement activities in 1989 included completing two projects that had been started in 1988: THE WVDP SPILL PREVENTION, CONTROL, AND COUNTERMEASURES PLAN (SPCC) revision, which was completed in January, and the ASBESTOS INSPECTION REPORT AND MANAGEMENT PLAN, which was issued in draft form in February 1989 and which included a site-wide characterization of asbestos-containing building materials.

Figure 2-10

Trends of Environmental Gamma Radiation Levels Quarterly Averages of 16 Perimeter TLDs (μR/hr)



- Another notable accomplishment was an inventory of all the chemical storage tanks so that applicable tanks could be registered with NYSDEC. Necessary upgrades were identified and scheduled. The updated inventory was included in a new revision of the SPCC issued in March 1990.

2. 6 Special Monitoring

2. 6. 1 Drum Cell Radiation Monitoring

During 1989 liquid high-level waste (supernatant from Tank 8D-2) processed by the Integrated Radwaste Treatment System (IRTS) produced approximately 4500 71-gallon drums of cement-solidified waste. These drums were added to the more than 2500 drums placed in the IRTS drum cell in 1988, for a total of more than 7000.

Most of the gamma radiation emitted from these drums is shielded by the drum cell walls. However, some radiation is emitted through the roof of the drum cell, which is unshielded. This radiation scatters in air and adds to the existing naturally occurring gamma-ray background.

Radiation exposure levels were monitored at various locations around the drum cell perimeter and at the closest location accessible by the public (300 meters west at Rock Springs Road). Baseline measurements were taken in 1987 and 1988 before placing the drums. Two types of measurements were taken: instantaneous, using a high pressure ion chamber (HPIC), and cumulative, using thermoluminescent dosimeters (TLDs).

The strength of the gamma-ray field can vary considerably from day to day because of changes in meteorological conditions, as evidenced by the two sets of HPIC readings taken during 1989. TLD measurements provide a more accurate estimate of long-term changes in the radiation field since they integrate the radiation exposure over an entire calendar quarter. Even such quarterly readings show evidence of a seasonal cycle. Annual variability in background radiation levels can depend on such factors as average temperature, air pressure, humidity, precipitation (including snow cover), and solar activity during a particular year.

Two sets of quarterly TLD measurements were taken at the Rock Springs Road locations nearest the drum cell. These measurements and locations are identified as TLD 28 and 31 in Table C-4. 1 in Appendix C-4 and Figure 2-9 above.

To assess any increase in the radiation field contributed at Rock Springs Road by the 7000–plus drums in the drum cell, the two sets of four quarterly measurements were summed and an average annual exposure rate of 82 mR/year was obtained. This value was compared to the average pre-drum cell background rate of 86 mR/year recorded during 1987-1988. The net contribution from the drum cell activities during 1989 therefore can not be distinguished from the annual variations in natural background.

2. 6. 2 Solvent Contamination

In November 1983, organic contamination was encountered in a USGS series 82 groundwater monitoring well near the NRC–licensed solid radioactive waste disposal area (now referred to as the NDA). Waste organic solvent containing a kerosene mixed with tributyl phosphate had been buried in tanks during operation of the reprocessing facility. Wells were drilled from 1984 to 1986 to monitor and recover the solvent from the disposal area. The apparent movement of solvent away from the buried location in 1988 initiated more extensive monitoring and characterization of the area.

Changes in the organic solvent levels that were observed in some wells monitored in November 1989 by the WVNS Waste Management group renewed concerns of migration.

Nonroutine sampling of well 85-I-9, a six-inch diameter PVC- cased well, and 89-5-N and 89-14-E, both two-inch steel-cased wells, began in early December 1989. These wells were selected because of their geographic proximity to surface drainage, adequacy of water volume with respect to the total sample volume needed, and the urgent need to perform sampling and analysis within a short time. Additionally, 85-I-9 was selected because it had recently undergone changes in the organic level and it contained sufficient water to allow complete sampling without regard to recharge rate. Wells 89-5-N and 89-14-E were selected also because their steel casings were not likely contribute to trace organic contamination as a PVC casing might.

An effort was made to sample only the aqueous phase of each well. However, because the sampling mechanism had to pass through the organic layer before reaching the aqueous layer, some of the overlying organic material was collected also. Because of unacceptably slow recharge rates of wells throughout the NDA all sampling occurred without prior well water purging. The well samples were submitted for a variety of analyses including volatile organics, semivolatile organics, pesticides, PCBs, and tributyl phosphate. A sufficient amount of sample material from 85-I-9 was available to allow additional testing for metals, biological and chemical oxygen demand, water quality, and selected radiological and nonradiological parameters. A "field blank" water sample was also submitted and a "laboratory blank" was provided by the testing lab. (A field blank is a sample of reagent grade water taken to the collection site and introduced to the sample container in the same manner as the samples. A laboratory blank is reagent grade water processed and analyzed as a sample, along with the actual samples. Blanks serve to determine if inadvertent contamination is being introduced during the process of sample collection, preparation, and analysis).

A subcontracted laboratory capable of handling organically and radiologically contaminated materials analyzed the samples. Results were first made available in late December 1989. The bulk of analyses yielded results below analytical detection limits with a few notable exceptions. A summary of the positive results can be found in Appendix E, Table 15.

Additional positive results were reported for a variety of unknown compounds, mainly saturated hydrocarbons. The testing laboratory performed a computer search of the National Institute of Standards and Technologies (NIST) Library before declaring these materials "unknown." The maximum concentration of any of the unknown compounds has been tentatively estimated at 2100 μg/L in well 85-I-9. The total concentration of all unkown compounds in well 85-I-9, mainly hydrocarbons, is estimated at 9200 μg/L. It is believed that these compounds originated from the organic solvent used during reprocessing operations. Although these concentrations are significant, they do not represent EPA-identified priority pollutants. Remediation efforts have continued in 1990 to ensure no off-site releases of these contaminants.

The relative significance of the presence of the organic material reported is not readily understood at this time. Confirmation of organic migration patterning and extent will require additional testing and analysis.

2.6.3 Closed Landfill Maintenance

Closure of the on-site nonradioactive construction and demolition debris landfill (CDDL, formerly the "cold dump") was completed in August 1986. The landfill area was closed in accordance with NYSDEC requirements for this type of landfill, following a closure plan (Standish, 1985) approved by NYSDEC. The closed facility was routinely inspected and maintained as specified by the closure requirements, including checking the closure area for proper drainage (i.e., no obvious ponding or soil erosion) and cutting the grass planted on the soil and clay cap. Groundwater monitoring in the area of the closed landfill is described in section 3.2.2.2.

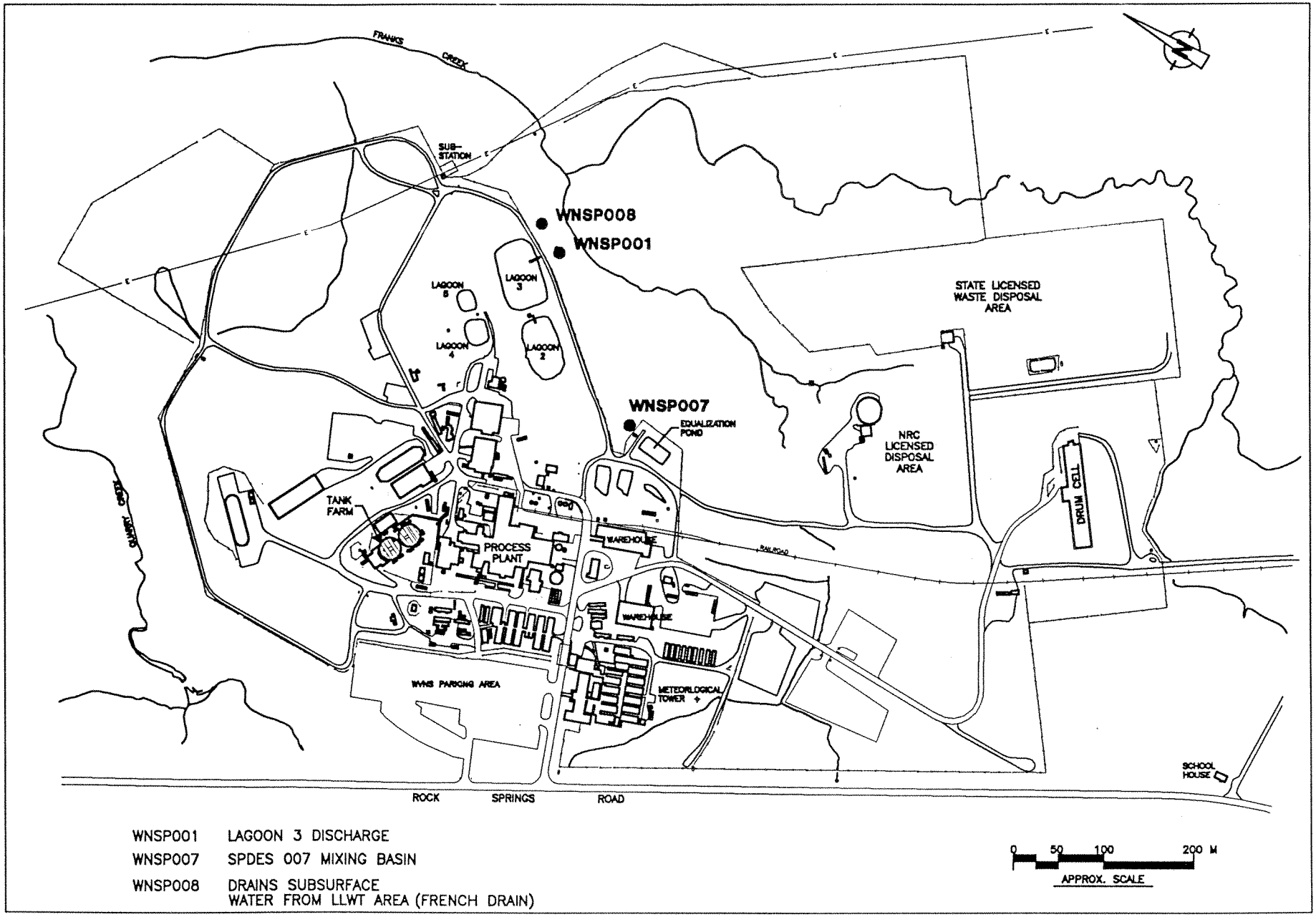


Figure 2-11. SPDES Monitoring Points.